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A comprehensive measure of product and international diversifications

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ABSTRACT

Assessing the relationship between diversification and performance has attracted a lot of attention for decades. However, the results of the studies about the relationship are inconclusive. This inconclusiveness might be due to using different measures of diversification and measurement problems. We developed a diversification measure and tested its predictive validity against the Total Global Diversification measure as the optimal measure of diversification. The new measure outperformed, and showed sigmoid relationship between international diversification and Tobin’s Q. Moreover, we found that product diversification did not have an effect on firms’ performance but positively moderated the relationship between international diversification and performance.

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1. Introduction

Diversified (product and international) firms play a significant economic role in both developed and developing nations (UNCTAD., 2010). The international- diversified firms have a large share of worldwide production, and the degree of international diversification has increased for companies in both developed and developing countries (UNCTAD., 2010; Hitt et al., 2006). Moreover, a large number of internationally diversified firms have also diversified their products (Chang & Wang, 2007). There are various reasons for diversification – (1) achieving market power (Contractor, 2012), (2) achieving economies of scale (Hennart, 2011; Collis & Montgomery, 2004), (3) achieving economies of scope (Contractor, 2012; Montgomery, 1994), (4) risk reduction (Bettis & Mahajan, 1985; Berger & Ofek, 1995), (5) cost effective sourcing (Contractor, 2012), (6) creating internal capital market and overcoming under investment problems (Rajan et al., 2000; Servaes, 1996), (7) escaping from current unattractive industry (Stowe & Xing, 2006), (8) tax reduction (Denis et al., 2002), (9) gaining international experience (Kirca et al., 2012) and (10) organizational learning (Wiersema & Bowen, 2011).

The link between product and international diversifications and performance has been the subject of study for over three decades. Researchers have mentioned non-significant (e.g. Sambharya, 1995), negative (e.g. Castañer & Kavadis, 2013), positive (e.g. Chang & Hong, 2000), and inverted U-shaped (e.g. Palich et al., 2000) relationship between Product Diversification (PD) and performance. The results of the empirical studies on the relationship between International Diversification (ID) and performance are inconclusive (Hennart, 2011; Contractor, 2012). Researchers have found insignificant (e.g. Tallman & Li, 1996), negative (e.g. Denis et al., 2002), positive (e.g. Zahra *et al.*, 2000; Ramírez-Alesón & Espitia-Escuer, 2001), inverted U-shaped (e.g. Ruigrok & Wagner, 2003), U-shaped (e.g. Capar & Kotabe, 2003) and sigmoid (e.g. Contractor et al., 2003) relationship between ID and performance.

Few studies have assessed the integrated effect of PD and ID on performance. Kim, Hwang, and Burgers (1989) have stated that ID helps related product diversifiers to achieve profit stability and unrelated product diversifiers to achieve profit growth. Sambharya (1995) has found that neither ID nor PD individually has an effect on a firm's performance but their interaction has a positive effect. Qian (1997) has mentioned that related product diversifiers with high level of ID have higher profitability than unrelated product diversifiers with the same level of ID as they have an opportunity to exploit the benefits of using similarities

among firm's business segments in a broad geographic market. On the other hand, Hitt, Hoskisson, and Kim (1997) have argued that PD has a positive moderating effect on the relationship between ID and performance. This is because following unrelated PD provides firms' managers with some skills and experiences that help them handle the complexity of ID. Therefore, learning from PD helps utilize the complementarity between PD and ID to achieve economies of scope and scale at the level that is not available to the firms which only follow product or international diversification. In contrast, Chang and Wang's (2007) study shows that the related PD has a positive effect on ID and performance relationship but unrelated PD negatively moderates the relationship. Finally, Oh and Contractor (2012; 2013) have found that PD negatively moderates the relationship between ID and performance for firms expanding into their home region and positively moderates the relationship for firms expanding into their foreign region.

By looking at the results of diversification and performance studies, one can infer that the results of studies in this area are inconclusive (Hennart, 2007; Palich *et al.*, 2000; Ramanujam & Varadarajan, 1989; Wiersema & Bowen, 2011). Researchers have mentioned that this inconclusiveness might be a result of measurement problems and using different measures of diversification and performance (Aggarwal *et al.*, 2011; Lien & Klein, 2009; Verbeke & Brugman, 2009; Wan *et al.*, 2011; Purkayastha *et al.*, 2012). As the validity of a study can increase by using different performance measures (market-based, accounting-based and growth-based) simultaneously (Ruigrok & Wagner, 2003), it seems that the resulted contradiction may be eliminated by correcting diversification measurement problems and having a standard measure of diversification (Aggarwal *et al.*, 2011; Lien & Klein, 2009).

2. Need for a Comprehensive Measure of Diversification

Making a decision about diversification strategy is one of the managers most important tasks (Collis & Montgomery, 2004; Chang & Wang, 2007). However, making a decision about diversification is not possible without the ability to measure diversification (Kim & Mauborgne, 1988; Robins & Wiersema, 1995; 2003). According to Harrington as quoted by Tennent (2008), 'measurement is the first step that leads to control and eventually to improvement. If you can't measure something, you can't understand it. If you can't understand it, you can't control it. If you can't control it, you can't improve it' (Tennent, 2008: :207). Therefore, without a measurement there is no chance to understand the effect of diversification on firms' performance and it is not possible to control and adjust the firms'

level of diversification. Scholars have mentioned different theories about the relationship between diversification and performance and have paid a lot of attention to assessing the relationship and testing the theories (Wan, 2005). Obviously, conducting these studies was not possible without access to a measure of diversification. However, the various measures introduced have their own benefits and drawbacks.

Researchers have used different measures of PD. They have used Rumelt's (1974) classification and broad and narrow mean spectrum matrix (Varadarajan & Ramanujam, 1987) as categorical measures of PD. The Rumelt's classification is subjective and applying that is time consuming and difficult (Lien & Klein, 2009; Chatterjee & Blocher, 1992; Hall & St. John, 1994; St. John & Harrison, 1999). The number of 4-digit SIC (Standard Industrial Classification) codes which a firm is active in has been used as another measure of PD (Bowen & Wiersema, 2005), but the measure cannot capture the size of businesses in a firm's portfolio as well as the relatedness among them (Kim, 1989). Moreover, researchers have used continuous measures of product diversification such as the Herfindahl index which can capture the size of the firm's businesses but not the relatedness (e.g. Bowen & Wiersema, 2005). Other continuous measures used are concentric index, weighted index and the entropy measure. Although these measures can capture the size of each business in a firm's portfolio and the relatedness among the firm's businesses, they use SIC hierarchy to capture the relatedness, and it is difficult to capture the relatedness by simply using the SIC hierarchy (Bryce & Winter, 2009). Moreover, the content validity of the entropy measure and the concentric index have been questioned by Robins and Wiersema (2003) since they have high sensitivity to the firm's number of businesses and size of the dominant business. Therefore, researchers have designed and introduced relatedness measures such as skill-based relatedness (Farjoun, 1994), technological relatedness (Robins & Wiersema, 1995; Silverman, 1999), strategic asset relatedness (Markides & Williamson, 1996), and manufacturing relatedness (St. John & Harrison, 1999) which can capture the relatedness among the firm's business based on the level of resource sharing. However, relatedness is multidimensional and each of those measures just can capture a dimension of it (Lien & Klein, 2009). So, Bryce and Winter (2009) by paying attention to the survivor principle have introduced a general inter-industry relatedness index as a multidimensional measure of relatedness. Nevertheless, it is an index of relatedness, and not a measure of PD (Bryce & Winter, 2009).

For measuring the ID, researchers have used categorical, single dimension and multidimensional measures (Li, 2007). For a measure of ID, capturing multidimensionality, breadth, depth and relatedness of ID are important (e.g. Verbeke & Brugman, 2009; Li, 2007). Sullivan's (1994a) DOI (degree of internationalization) as a multidimensional measure of ID can capture the relatedness, and breadth and depth of it (Verbeke & Brugman, 2009). According to Kim (1989) diversification has two dimensions and each of the PD and ID measures only capture one dimension of that. Therefore, they are not appropriate to assess the effect of total diversification on firms' performance (Vachani, 1991; Kim, 1989).

Kim (1989) has introduced the global diversification measure by using the decomposability of the entropy measure and adding a geographic dimension to it. But his measure cannot capture the related and unrelated ID. Therefore, by using the decomposability of the entropy measure, Vachani (1991) has introduced total global diversification index (TGD) as a comprehensive measure of diversification which can capture related and unrelated PD as well as related and unrelated ID. However, TGD is entropy based, and it cannot capture the relatedness among the firm's businesses based on the level of resource sharing and multidimensionality of relatedness. Besides, TGD cannot capture the multidimensionality of ID and its breadth and depth. Therefore, there is a need for a new comprehensive measure of diversification which can capture relatedness among the firm's businesses based on the level of resource sharing and multidimensionality of relatedness as well as multidimensionality, breadth, depth and relatedness of ID.

3. Development of the Measure of Diversification

In order to derive the new measure of diversification, we use the measures developed by (1) Bryce and Winter (2009) for measuring PD, (2) Sullivan (1994) for measuring ID and (3) Vachani (1991) for an integrated measure of total global diversification.

3.1 Measure related to PD

Define WAR_i as the weighted average relatedness of activity i to all other activities of the firm, WAR_p as the sum of WAR_is in a firm's portfolio, $WARN_i$ as the weighted average relatedness of activity i to its closest neighbors, $WARN_p$ as the sum of $WARN_i$s in a firm's portfolio, and AVG_p as the average of relatedness among a firm's businesses. Define WAR_{pmax} as the maximum of WAR_p in the sample, $WARN_{pmax}$ as the maximum of $WARN_p$ in the sample and AVG_{pmax} as the maximum of AVG_p. Based on the studies by Bryce and Winter (2009),

Berry (1971), Bowen and Wiersema (2005) and Teece *et al.* (1994), the indices for PD can be derived as follows (refer to Appendix A for a complete derivation):

$$PD_{war} = 1 - \frac{WAR_p}{WAR_{p\max}} \quad (1)$$

$$PD_{warn} = 1 - \frac{WARN_p}{WARN_{p\max}} \quad (2)$$

$$PD_{avg} = 1 - AVG_p \quad (3)$$

For a completely related portfolio, the above indices will take a value of zero and for a completely unrelated portfolio the indices will take a value of one.

3.2 Measure related to ID

To measure the degree of firm's international diversification, Sullivan's (1994a) Degree of internationalization (DOI) was used. Sullivan (1994a) has used "the item-total analysis for constructing homogeneous measures" method to estimate the internal consistency of a linear combination of single-item proxies of the degree of internationalization" (Sullivan, 1996: 180). The DOI has some privileges over other measures of ID. The first is that the index can capture multidimensionality of ID. The second, it can also capture the Vachani's concept about the related and unrelated international geographic diversification, as well as breadth and depth of ID.

$$DOI = FSTS + FATA + OSTS + PDIO + TMIE \quad (4)$$

where, FSTS - Foreign Sales as a percentage of Total Sales, FATA - Foreign Assets as a percentage of Total Assets, OSTS - Overseas Subsidiaries as a Percentage of Total Subsidiaries, PDIO - Psychic Dispersion of International Operation and TMIE - Top Managers' International Experience.

As the components of the index are ratios, the maximum value for each of them is one. Therefore $0 \leq DOI \leq 5$ (Sullivan, 1994a). To make the range of ID similar to PD

$$ID \equiv \frac{DOI}{DOI_{max}} \Rightarrow 0 \leq ID \leq 1 \quad (5)$$

Now we can use the results of the PD and ID measures as proportions. For instance, when ID is equal to 0.2, it means that the level of international diversification for a firm is 20 percent. And when a firm has PD equal to 0.3, it means that 30 percent of activities in the firm's portfolio are unrelated.

As PD_{war}, PD_{warn}, PD_{avg} and ID indices are ratios and do not have a unit, following Vachani (1991) and Wolf (1977), we can construct the new comprehensive measures of diversification as follows:

$$CMD_{war} = PD_{war} + ID \quad (6)$$
$$CMD_{warn} = PD_{warn} + ID \quad (7)$$
$$CMD_{avg} = PD_{avg} + ID \quad (8)$$

CMD_{war}, CMD_{warn} and CMD_{avg} are three new comprehensive measures of diversification which can capture the relatedness among a firm's businesses based on the level of resource sharing and multidimensionality of relatedness and international diversification as well as Vachani's concept about related and unrelated international diversification and breadth and depth of ID. Please take note that instead of using the summation of the components of CMD in a regression, the same as TGD one has to use the measure's components separately because of missing data.

4. Testing the New Measure

Following other studies (Lien & Klein, 2009; Bryce & Winter, 2009), given the assumption that the superior measure of diversification can predict a firm's performance better, the predictive validity of CMD has been tested against TGD. The main reason TGD is chosen for comparison is because among the indices it is the optimal index of diversification to capture the related and unrelated PD and ID (Sambharya, 1995). Since scholars (e.g. Hitt *et al.*, 1994; Robins & Wiersema, 1995; Wan, 2005) have argued the effect of diversification on the firms' performance has been a strategic management's central concern for decades, the relationship between diversification and performance has been assessed to test the predictive validity of the measures. So, we hypothesize that:

Hypothesis 1. CMD can explain a firm's performance better than TGD.

4.1 Sample and data

The sample was drawn from manufacturing firms in Fortune 1000 list. The rationales for choosing this list are: 1) They have much longer history of PD and ID (Li & Qian, 2005), 2) many of them have operated in different product and international markets (Geringer et al., 2000), 3) they have financial resources to follow both PD and ID (Li & Qian, 2005) and 4) Bryce and Winter (2009) inter-industry relatedness index is designed for manufacturing firms. After collecting the data of firms' 4-digit SIC codes, the firms which had completely manufacturing portfolio were selected. The screening resulted in 136 firms. However, this

sample decreased to 131 firms for TGD due to data availability. We used Worldscope database and Dun & Bradstreet (D&B) directories (America's corporate families and international affiliates and Reference book of corporate management) to obtain the relevant data for calculations. The year 2011 was selected as the time of the study, due to the data availability.

The data for PD part of CMD has been collected from Worldscope Fundamentals. To calculate CMD's PD part there is a need to collect the data for firms' 4-digit SIC codes. The most used databases to collect the data are Compustat North America by Standard and Poor's and Worldscope Fundamentals by Thomson Financial (Ulbricht & Weiner, 2005). The result of Ulbricht and Weiner (2005) study shows that for doing research on U.S. firms Worldscope is as competitive as Compustat, and according to the data guides of Worldscope and Compustat, none of the databases provides historical data on firms' 4-digit SIC codes. Therefore, Worldscope Fundamentals was selected for collecting the data for firms' 4-digit SIC codes. To calculate ID part of CMD which is Sullivan's (1994a) DOI, D&B's America's corporate families, D&B's America's corporate families and international affiliates, D&B's Reference book of corporate managements and Worldscope were used. These are the same databases used by Sullivan (1994a; 1994b), except Worldscope which have used to collect data for FSTS and FATA components. It is worth to mention that Sullivan (1994a; 1994b) also used one year data to measure OSTS, PDIO, and TMIE due to the data availability.

For calculating TGD, D&B directories have been used to collect data. To measure TGD there is a need for corporate hierarchy information which is provided by two companies of LexisNexis and D&B (Vicic, 2007; Zimmerman: date of access 25 January 2013). In this regard one can use either LexisNexis Corporate Affiliations or D&B's directories (D&B's America's corporate families, and D&B's America's corporate families and international affiliates). In contrast to the D&B directories, LexisNexis Corporate Affiliations provides historical data on firms' subsidiaries' 4-digit SIC codes, but the segments are not arranged in decreasing order of importance like D&B's directories. This makes impossible to distribute total number of employees to the subsidiary's business segments according to the geometric series. So, the D&B directories were used which also follows the other researchers database selection (Vachani, 1999; e.g. Kim et al., 1989; Kim et al., 1993). There were missing data for a small number of subsidiaries, and following the approach by Hoopes (1999), one employee was assigned to each of these subsidiaries. Finally, Worldscope was used to collect the data on financial and control variables.

4.2 Variables

4.2.1 Dependent variable

As performance is multidimensional (Combs et al., 2005), the validity of a study can be increased by using multiple performance measures (Ruigrok & Wagner, 2003). Therefore, performance was measured by accounting-based, market-based and growth-based indicators. Among accounting-based measures ROA (return on assets) which was measured as after tax return on total assets and ROS (return on sales) which was measured as after tax return on total sales were selected as the two measures widely used in diversification studies (Li & Qian, 2005; Geringer *et al.*, 2000). ROE (return on equity) was not chosen because it was more sensitive to the capital structure differences among firms (Hitt, *et al*., 1997). Tobin's Q which was measured as (market value of equity + book value of debt)/ total assets (Amit & Livnat, 1988) was selected as a market-based performance measure which was used by a large number of studies in finance and strategic management (Chang & Wang, 2007). Finally, sales growth was chosen as a growth-based performance measure which could capture the market expansion of a firm when the firm priority objective was to increase market share (Geringer, *et al.*, 2000).

4.2.2 Independent variables

PD and ID were measured by the components of the new comprehensive measure of diversification. The Worldscope lists a firm's 4-digit SIC codes in decreasing order of importance but does not list sales generated within each segment (Gedajlovic & Shapiro, 1998; Pils, 2009). Following other researchers (e.g. Gedajlovic & Shapiro, 1998; Kim *et al.*, 1989; Vachani, 1999; Caves *et al.*, 1980; Pils, 2009), the aggregate sales figure was distributed to the firm's business segments according to a geometric series. Therefore, if S is the number of the segments in the firm's portfolio then the primary segment will get $\frac{2^{S-1}}{\sum_{n=0}^{S-1} 2^n}$.

For example, for a firm which is active in three different segments (three different 4-digit SIC codes), 57 percent (4/7) of sales would be assigned to the primary segment and 29 percent (2/7) and 14 percent (1/7) of sales would be assigned to the firm's second and the third segments, respectively.

The components of TGD measure were computed as indicated by Vachani (1991; 1999). As D&B directory did not provide the number of employees within each segment for

a subsidiary, the total number of employees was distributed to the subsidiary's business segments according to a geometric series (Vachani, 1999).

4.2.3 Control variables

Following studies that assessed the relationship between diversification and performance (e.g. Geringer *et al.*, 2000; Grant *et al.*, 1988; Chang & Wang, 2007), firm size, firm leverage and industry effects were selected as control variables. Firm size was measured by natural logarithm of employee number (Zahra *et al.*, 2000; Ruigrok & Wagner, 2003), and leverage was measured by ratio of long term debt to total capital (debt plus equity) (Tallman & Li, 1996; Geringer *et al.*, 2000). To capture the industry effects some studies used industry characteristics (e.g. Tallman & Li, 1996; Tanriverdi & Venkatraman, 2005), and others used industry dummy variables (e.g. Geringer *et al.*, 2000; Thomas & Eden, 2004). In our study, following Tanriverdi, and Venkatraman (2005) to control for industry effect, we have used the average of industry sales growth, ROS, ROA and Tobin's Q.

4.3 Sensitivity test – PD components of CMD

Robins and Wiersema (2003) have highlighted that related component of the entropy index and the concentric index (most used measures of related product diversification) have content validity problems because the measures are sensitive to the number of businesses in a firm's portfolio and the size of the firm's dominant business which may not be directly linked to the portfolio relatedness. Therefore, before testing the predictive validity of CMDs, the sensitivity of the PD parts of the measures to the number of businesses and size of the dominant business were assessed.

The result shows that number of businesses is negatively linked to PD_{war} (r = -0.82) and PD_{warn} (r = -0.96). In contrast, the size of the dominant business has positive association with PD_{war} (r =0 .75) and PD_{warn} (r = 0.82). So, PD_{war} and PD_{warn} are decreased by increasing the number of businesses in a firm's portfolio and they are increased by growth of the dominant business size. In contrast, PD_{avg} has a negligible association with number of businesses (r = 0.21) and the size of dominant business (r = -0.13). Therefore, for further analysis and comparison, we used the measure, CMD_{avg} (as given in equation (8)).

4.4 Regression models

To test the relationship between PD, ID and performance and to compare the effectiveness of TGD and CMD, we have used seven ordinary least squares (OLS) regression models (Models 1 through 7). Model 1 captures the relationship between PD, ID and performance based on Vachani's TGD measure and Model 2 through Model 7 capture the relationship based on our CMD measure. While developing the regression models based on the CMD measure, we have used the three features recommended by the researchers in studying the relationship between diversification and performance. First, the relationship can be linear, U-shaped, inverted U-shaped and sigmoid. Second, firms that follow related PD have a higher performance than those that follow unrelated PD. Third, capturing the joint effect of PD and ID on performance is an important task (e.g. Chang & Wang, 2007; Sambharya, 1995; Hitt *et al.*, 1997; Qian, 2002; Oh & Contractor, 2012). One of the superiority of CMD over TGD is that, the regression models based on CMD can capture the interaction and curvilinear effects, in contrast to the TGD which cannot capture the interaction effect and the curvilinear relationship between ID and performance (Hitt, *et al.*, 1997). The regression models are:

Model (1 is based on TGD): Performance = C+β_1(Industry effect) + β_2 (Leverage) + β_3 (Firm size) + β_4UPD + β_5RPD + β_6UGD + β_7RGD + u_i, where, UPD - Unrelated product diversification, RPD - Related product diversification, UGD - Unrelated international geographic diversification, RGD - Related international geographic diversification, u_i is error term and $u_i \sim N(0,1)$, $\forall_i$.

Models (2 through 7 are based on CMD) are divided into two categories: models without interaction effect and models with interaction effect.

Category 1- without interaction effect: Performance = C + β_1(Industry effect) + β_2 (Leverage) + β_3 (Firm size) + β_4PD + $\sum_1^{a} \beta_{4+a} ID^{a} + u_i$

Category 2 - with interaction effect: Performance = C + β_1(Industry effect) + β_2 (Leverage) + β_3 (Firm size) + β_4PD + $\sum_1^{a} \beta_{4+a} ID^{a} + \beta_{5+a} (PD \times ID^{a}) + u_i$.

In both these categories, a = 1 for models 2 and 3, a = 2 for models 4 and 5, a = 3 for models 6 and 7, PD - Degree of product diversification, ID - Degree of international diversification, u_i is error term and $u_i \sim N(0,1)$, $\forall_i$. As indicated earlier, we use PD_{avg} for measuring *PD* and

four measures of performance–sales growth, ROS, ROA and Tobin's Q to assess the predictive ability of CMD measure.

5. Results

5.1 Based on Vachani's TGD

Table 1 reports means, standard deviations, and correlations for all observed variables used to test the predictive validity of the TGD measure. The variance inflation factor for the independent variables were less than 5 and there were no problems related to multicollinearity effect (Chatterjee & Hadi, 2006; O'Brien, 2007). Table 2 presents the results of regressing firm performance on TGD after controlling for industry effect, leverage and firm size. The results show that none of the performance variables can be significantly explained by TGD measure. In the sales growth and Tobin's Q equations, none of the components of TGD is significant. RGD (Related global diversification) is negative and significant in the ROS and ROA equations and UGD (Unrelated global diversification) is significant and positive in the ROA equation.

5.2 Based on CMD

Table 3 presents means, standard deviations, and correlations for all observed variables used to test the predictive validity of CMDavg. Low correlation among the variables suggested no problems with multicollinearity. The variance inflation factor for independent variables were less than 5 (Chatterjee & Hadi, 2006; O'Brien, 2007), except for ID and terms related to ID (Chang & Wang, 2007). The results of the predictive validity test for CMDavg are shown in Table 4. Among models which do not contain the interaction (Models 2, 4 and 6), model 6 for Tobin's Q equation was significant and explained 11.2 percent of the variance in Tobin's Q (adjusted R2 = 0.06). Based on the results, PD does not have individual effect on performance as the PD variable is not significant for any of the models (2, 4 and 6) for different measures of performance. Model 6 (Performance measure –Tobin's Q) shows a sigmoid relationship between ID and Performance.

Table 1
Descriptive statistics and correlation matrix: TGD

Variables	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11	12	13
1.Sales growth	0.15	0.21													
2.ROS	8.76	7.43	0.08												
3.ROA	8.02	6.29	0.18*	0.80**											
4.Tobin's Q	1.37	0.88	0.06	0.54**	0.58**										
5.UPD	0.83	0.48	-0.17	-0.03	-0.03	-0.08									
6.RPD	0.46	0.49	-0.11	-0.04	-0.06	-0.07	-0.28**								
7.UGD	0.39	0.32	-0.11	0.02	0.1	-0.09	0.26**	0.06							
8.RGD	0.17	0.22	-0.02	-0.12	-0.08	-0.13	0.22*	0.19*	0.53**						
9.Industry sales growth	0.13	0.05	0.15	-0.08	0	-0.14	-0.01	-0.1	-0.09	-0.11					
10.Industry ROS	6.46	1.87	0.05	0.1	0.15	0.1	-0.14	0.12	0.06	0.15	0.18*				
11.Industry ROA	6.24	1.5	0.07	-0.03	0.09	0.06	-0.20*	0.22*	0.01	0.09	0.36**	0.84**			
12.Industry Tobin's Q	1.08	0.34	-0.03	0	0.08	0.07	-0.1	0.19*	0.09	0.17	-0.04	0.82**	0.77**		
13.Leverage	-30.82	757.96	-0.06	0.06	0.04	0.07	-0.04	0.06	-0.09	0.03	-0.08	0.01	-0.02	0.09	
14.Firm size	9.39	1.09	-0.17	-0.03	-0.09	-0.12	0.1	0.04	0.33**	0.04	-0.16	-0.13	-0.13	-0.12	0.01

Table 2
Predictive Validity of TGD

	Sales growth	ROS	ROA	Tobin's Q
Independent/Control Variables				
Intercept	0.37*	9.4	13.75*	2.22**
Industry sales growth	0.01			
Industry ROS		0.45		
Industry ROA			0.4	
Industry Tobin's Q				0.2
Leverage	0	0	0	0
Firm size	-0.02	-0.36	-0.9	-0.09
UPD	-0.06	-0.12	-0.54	-0.1
RPD	-0.06	-0.39	-0.91	-0.14
UGD	-0.04	3.73	5.50*	0.09
RGD	0.09	-7.60*	-6.27*	-0.52
R-squared	0.08	0.05	0.08	0.05
Adjusted R-squared	0.03	0	0.02	0.01
F-statistic	1.5	0.93	1.48	0.89
Prob(F-statistic)	0.17	0.49	0.18	0.52

N=131, *p<0.05, **p<0.01

Table 3
Descriptive statistics and correlation matrix: CMDavg

Variables	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11
1.Sales growth	0.15	0.21											
2.ROS	8.63	7.85	0.08										
3.ROA	7.91	6.57	0.17*	0.82**									
4.Q	1.37	0.87	0.06	0.53**	0.58**								
5.ID	0.34	0.17	-0.18*	0.15	0.16	0.07							
6.PDavg	0.33	0.18	-0.01	-0.09	-0.13	-0.04	0.02						
7.Industry sales growth	0.13	0.05	0.16	-0.05	0.02	-0.14	-0.1	-0.08					
8.Industry ROS	6.47	1.87	0.04	0.13	0.18*	0.11	0.1	0.07	0.18*				
9.Industry ROA	6.25	1.5	0.06	0.02	0.13	0.07	0.02	0.05	0.36**	0.84**			
10.Industry Tobin's Q	1.08	0.34	-0.04	0.02	0.09	0.07	0.14	0.13	-0.04	0.77**	0.82**		
11.Leverage	-28.34	743.9	-0.06	0.06	0.03	0.07	-0.07	0.1	-0.08	-0.02	0.07	0.08	
12.Firm size	9.44	1.13	-0.17*	0.02	-0.05	-0.1	0.33**	0.17*	-0.14	-0.1	-0.1	-0.1	0.02

N=136, *p<0.05, **p<0.01

Table 4
Predictive validity of CMDavg

	Sales growth						ROS					
Independent/Control Variables	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	0.32†	0.52**	0.39*	0.49**	0.45*	0.53**	4.51	11.15	2.75	9.28	2.49	8.68
Industry sales growth	0	0	0	0	0	0						
Industry ROS							0.54	0.55	0.51	0.52	0.51	0.52
Industry ROA												
Industry Tobin’s Q												
Leverage	0	0	0	0	0	0	0	0	0	0	0	0
Firm size	-0.02	-0.03	-0.02	-0.03	-0.02	-0.03	0	-0.25	-0.01	-0.34	-0.01	-0.33
PDavg	0.03	-0.36	0.02	-0.18	0.03	-0.1	-4.84	-18.32*	-4.52	-17.44**	-4.61	-15.30**
ID	-0.17	-0.58	-0.65	-0.53	-1.5	-1.51	6.65	-7.87	25.54†	33.45*	30.88	29.64
ID squared			0.79	0.03	3.98	4.25			-31.23	-81.25**	-51.38	-28.85
ID cubed					-3.25	-4.64					20.65	-90.05
PDavg ´ ID		1.27*						44.41†				
PDavg ´ ID squared				1.66						109.29**		
PDavg ´ ID cubed						2.69						212.81**
R-squared	0.07	0.09	0.08	0.09	0.08	0.1	0.05	0.08	0.06	0.11	0.06	0.12
Adjusted R-squared	0.03	0.05	0.03	0.04	0.03	0.04	0.02	0.03	0.02	0.07	0.01	0.07
F-statistic	1.85	2.27	1.8	1.89	1.67	1.7	1.43	1.8	1.48	2.39	1.26	2.2
Prob(F-statistic)	0.11	0.04	0.1	0.07	0.12	0.1	0.22	0.1	0.19	0.02	0.28	0.03

N=136, *p<0.05, **p<0.01, ***p<0.001

Table 4 (Continued)
Predictive validity of CMDavg (Continued)

	ROA						Tobin's Q					
Independent/Control Variables	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	7.89	13.15*	7.77	12.68*	6.68	11.61†	2.09**	2.67**	1.94**	2.64***	1.47*	2.17*
Industry sales growth												
Industry ROS												
Industry ROA	0.54	0.56	0.54	0.56	0.51	0.52						
Industry Tobin's Q							0.09	0.1	0.09	0.08	-0.09	-0.09
Leverage	0	0	0	0	0	0	0	0	0	0	0	0.00***
Firm size	-0.44	-0.64	-0.44	-0.69	-0.41	-0.67	-0.1	-0.12†	-0.1	-0.14	-0.1	-0.13
PDavg	-5.01	-15.76*	-4.99	-14.80**	-5.35	-13.82**	-0.16	-1.32	-0.13	-1.50*	-0.29	-1.48*
ID	7.26*	-4.31	8.4	14.43	30.14	29.27	0.62	-0.63	2.25	3.1	14.23***	14.13***
ID squared			-1.89	-39.87	-84.2	-66.65			-2.7	-8.02*	-47.70***	-45.29**
ID cubed					84.49	-2.98					46.12**	33.83*
PDavg ´ ID		35.41†						3.83				
PDavg ´ ID squared				82.92*						11.60*		
PDavg ´ ID cubed						168.68**						23.82**
R-squared	0.07	0.09	0.07	0.11	0.07	0.12	0.03	0.05	0.04	0.09	0.11	0.17
Adjusted R-squared	0.03	0.05	0.02	0.06	0.02	0.07	0	0	0	0.04	0.06	0.12
F-statistic	1.9	2.15	1.58	2.27	1.43	2.26	0.88	1.08	0.9	1.74	2.31	3.26
Prob(F-statistic)	0.1	0.05	0.16	0.03	0.2	0.03	0.5	0.38	0.5	0.1	0.03	0

N=136, *p<0.05, **p<0.01,***p<0.001

Adding the interaction effect has improved the adjusted R^2 of all models for all performance variables. Table 5 shows the results of the hierarchical regression predicting firms' performance from firm size, industry effect, leverage, PD and ID. The results for the sales growth shows that adding the interaction to the direct effect model with linear ID has changed the R^2 significantly ($\Delta R^2 = 0.03, p < 0.05$). For ROS, adding the interaction to the direct effect models have improved the R^2 significantly for models with squared ID ($\Delta R^2 = 0.05, p < 0.01$) and cubed ID ($\Delta R^2 = 0.06, p < 0.01$). For ROA, adding PD and ID variables to the control variables has significantly improved R^2 for models with linear ID ($\Delta R^2 = 0.05, p < 0.05$). Moreover, adding the interaction to the direct effect models has significantly improved the R^2 for models with squared ID ($\Delta R^2 = 0.04, p < 0.05$) and cubed ID ($\Delta R^2 = 0.05, p < 0.01$). Finally, for Tobin's Q, adding the PD and ID variables to the control variables has changed the R^2 significantly ($\Delta R^2 = 0.09, p < 0.05$) for a model with cubed ID. Also, adding the interaction to the direct effect models has changed the R^2 significantly for models with squared ID ($\Delta R^2 = 0.05, p < 0.05$) and cubed ID ($\Delta R^2 = 0.06, p < 0.01$).

5.2.1 CMD – Diversification vs Sales growth

Among the models for sales growth, model 3 has the highest adjusted R^2 (0.05), and the linear relationship between ID and sales growth is positively moderated by PD. Figure 1 depicts the moderating effect of PD on the relationship between ID and sales growth for the model 3. Since the results do not support the effect of control variables on the firms' performance to draw the graphs, control variables are removed from the models (Hitt et al., 1997). For example, Figure 1 shows that a firm with the degree of internationalization of 0.3 and degree of product diversification of 0.4 has higher performance than firms with the same level of ID but lower level of PD. This positive effect is increased by increasing the degree of internationalization.

Table 5
Summary of the results of hierarchical regression

Performance	Models	Linear ID			Squared ID			Cubed ID		
		R square change	F Change	Sig. F Change	R square change	F Change	Sig. F Change	R square change	F Change	Sig. F Change
Sales Growth	Control variables	0.05	2.32	0.08	0.05	2.32	0.08	0.05	2.32	0.08
	Direct effect models	0.02	1.14	0.32	0.03	1.27	0.29	0.03	1.17	0.32
	Models with interaction	0.03	4.11	0.04	0.02	2.34	0.13	0.01	1.82	0.18
	Control variables	0.02	0.99	0.4	0.02	0.99	0.4	0.02	0.99	0.4
ROS	Direct effect models	0.03	2.07	0.13	0.04	1.94	0.13	0.04	1.45	0.22
	Models with interaction	0.02	3.51	0.06	0.05	7.42	0.01	0.06	8.32	0
	Control variables	0.02	0.84	0.47	0.02	0.84	0.47	0.02	0.84	0.47
ROA	Direct effect models	0.05	3.45	0.03	0.05	2.28	0.08	0.05	1.86	0.12
	Models with interaction	0.02	3.24	0.07	0.04	6.06	0.01	0.05	7.49	0.01
	Control variables	0.02	0.86	0.46	0.02	0.86	0.46	0.02	0.86	0.46
Tobin's Q	Direct effect models	0.01	0.91	0.4	0.02	0.94	0.42	0.09	3.34	0.01
	Models with interaction	0.01	2.05	0.15	0.05	6.57	0.01	0.06	8.95	0

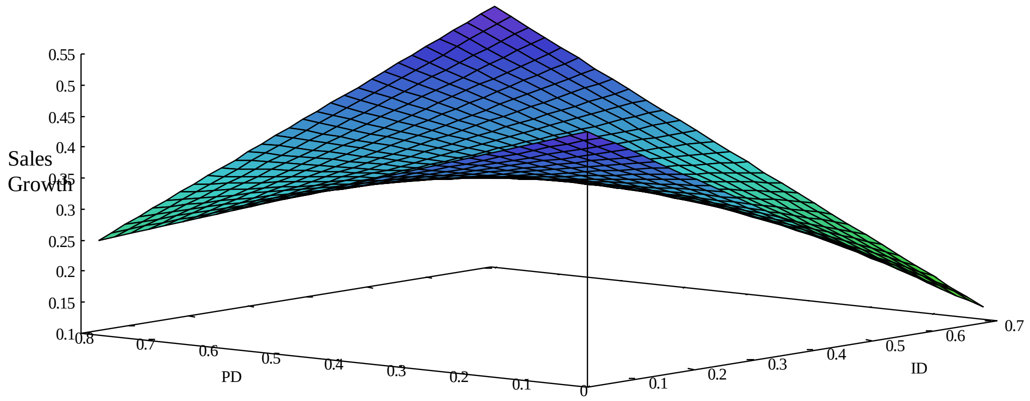

Figure 1
Moderating effect of PD on the relationship between ID and sales growth

5.2.2 CMD – Diversification vs ROS

For the performance measure ROS, models 5 and 7 are significant and model 5 has higher adjusted R^2 (0.07). The results show that PD positively moderates the curvilinear relationship between ID and ROS. Figure 2 presents the moderating effect of PD on the relationship between ID and ROS for model 5. For instance, the figure shows that a firm with the degree of internationalization of 0.25 and the degree of product diversification of 0.5 has higher performance than firms with the same degree of ID but lower level of PD. This positive effect is more intensive for firms with higher level of ID.

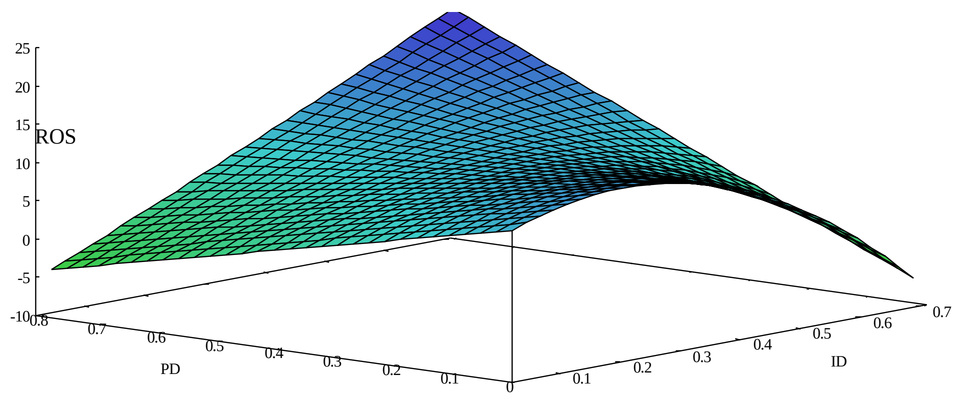

Figure 2
Moderating effect of PD on the relationship between ID and ROS

5.2.3 CMD – Diversification vs ROA

Among the models using ROA as the performance measure, the adjusted R^2 (0.069) was highest for model 7 and PD positively moderated the sigmoid relationship between ID and

performance. Figure 3 shows the moderating effect of PD between ID and ROA for model 7. The figure indicates that similar to ROS, the positive moderating effect of PD on the relationship between ID and ROA increases by raising the level of ID.

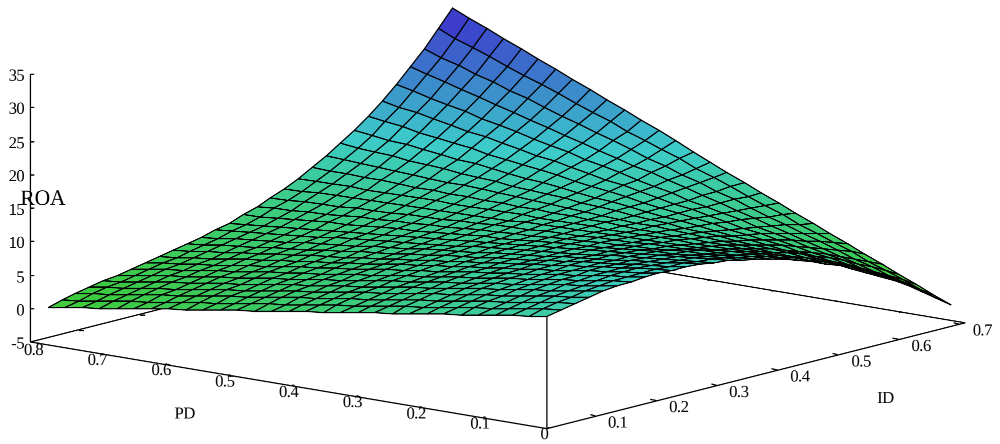

Figure 3
Moderating effect of PD on the relationship between ID and ROA

5.2.4 CMD – Diversification vs Tobin's Q

For Tobin's Q, model 7 is significant and explains 17 percent of the variance in Tobin's Q (adjusted R^2 of 0.12). Similar to ROA, the sigmoid relationship between ID and Tobin's Q is positively moderated by PD. Figure 4 presents the moderating effect of PD on the relationship between ID and Tobin's Q. As an example, in Figure 4, a firm with degree of internationalization of 0.4 and degree of product diversification of 0.4 have higher Tobin's Q than the firms with similar level of ID, but the degree of PD lower than 0.4. The improvement of Tobin's Q by following PD is higher for firms with higher level of ID.

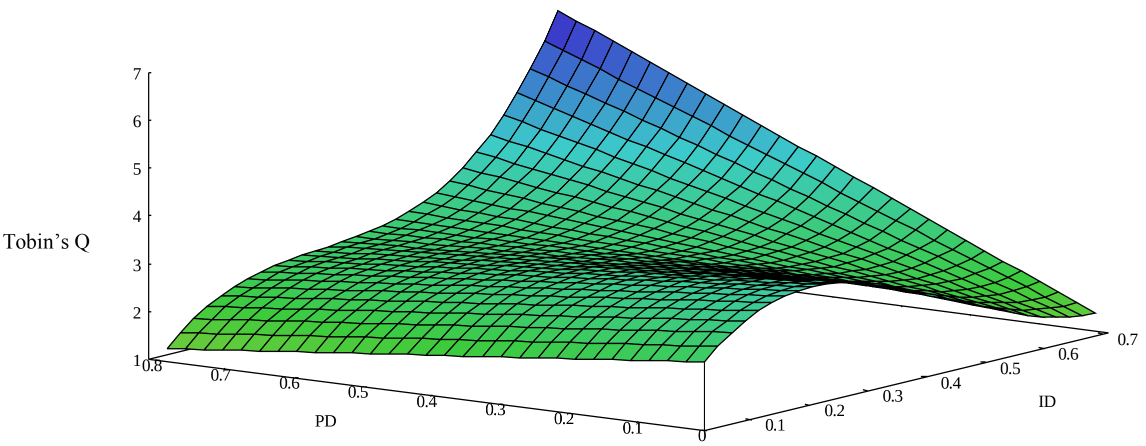

Figure 4
Moderating effect of PD on the relationship between ID and Tobin's Q

6. DISCUSSION

To the best of our knowledge, this is the first study that has applied TGD to assess the relationship between diversification and performance as suggested by Vachani (1999). However, from the results it can be observed that CMD performs better than TGD. CMD can significantly explain the performance variables (sales growth, ROS and ROA) when the interaction effect between PD and ID is added to the regression models and with and without interaction effect for the performance measure, Tobin's Q. The most important finding of the study is that using Bryce and Winter's inter-industry relatedness index and Sullivan's DOI to design a new comprehensive measure of diversification which can capture relatedness among the firm's businesses based on the level of resource sharing and multidimensionality of relatedness as well as multidimensionality, breadth, depth and relatedness of ID and have an ability to capture independent and interactive effects of PD and ID on firms' performance improves the predictive ability of the comprehensive measure of diversification.

Studies that have tested the relationship between PD and performance have mixed findings. For example, Christensen and Montgomery (1981) and Sambharya (1995) have shown that there is no relationship between PD and performance; Castañer and Kavadis (2013), Laeven and Levine (2007), Chang and Hong (2000), and Palich, *et al*. (2000) have shown that there is a relationship (negative, positive or inverted U-shaped) between PD and performance. Most of these studies have used (1) entropy and concentric indices which have content validity problems and (2) SIC hierarchy to capture the relatedness. Our measure, CMD that can capture the relatedness among firms businesses based on the level of resource sharing and multidimensionality of the relatedness and is insensitive to the number of businesses in a firm's portfolio and size of the dominant business has shown that there is no direct relationship between PD and performance. This result does not support the resource-based view argument about higher performance of related product diversifiers. So, as Colak (2010) mentioned, PD can increase or decrease a firm's performance and it is not a systematic phenomenon.

Analysis of the effect of ID on performance shows some interesting results. ID does not have any effect on growth-based measure (sales growth) and accounting-based measures of performance (ROS and ROA). According to some scholars, U.S. firms are more concerned about the profitability rather than growth (e.g. Geringer et al., 2000). However, ID has a sigmoid relationship with a market-based measure of performance (Tobin's Q). Similar to the

results of the study by Thomas and Eden (2004), the signs of coefficients of ID are opposite to the recommendations by evolutionary theory of internationalization. Based on the evolutionary theory at the early stage of ID, firm's performance decreases because of learning cost, liability of foreignness and low level of economies of scale, then by learning how to do business in the new markets, accessing to low cost resources, achieving economies of scale and scope, and decreasing transactions cost through internalization, the performance increases at the middle stage of ID, but after that decreases because of higher coordination and governance costs (Cardinal, *et al.*, 2011; Contractor, *et al.*, 2003; Lu and Beamish, 2004). However, finding this result is not surprising because among the studies that have found sigmoid relationship between ID and performance (Contractor, *et al.*, 2003; Li, 2005; Lu and Beamish, 2001; Sullivan, 1994; Thomas and Eden, 2004), the studies by Sullivan (1994) and Thomas and Eden (2004) are focused on large manufacturing firms and only one study (Thomas and Eden, 2004) has assessed the relationship between ID and Tobin's Q. One possible explanation for our results is that at the first stage of ID, the performance of a firm increases since the firm is diversified to the markets which are geographically and culturally close to its home market (Johanson & Vahlne, 1977) and the ID helps the firm to achieve some advantages such as economies of scale and scope as well as cost effective sourcing (Contractor, 2012; Hitt, *et al.*, 1994). However, by increasing the level of ID and moving to the geographic markets which are less familiar to the firm, the firm's performance reduces due to the liability of foreignness and learning cost. But, following further ID provides firm with experience and knowledge on doing business in foreign markets, acquisition of these new experience and knowledge allows the firm to capture the benefits of ID (Cardinal *et al.*, 2011; Ruigrok & Wagner, 2003). Moreover, finding the sigmoid relationship between ID and market-based measure of performance and not finding a relationship between ID and accounting-based measures, imply that Tobin's Q can capture the potential benefits of ID better than ROA and ROS as it takes into account both tangible and intangible assets of the firms and shows the long term expected performance of the firms (Thomas & Eden, 2004).

The results of our research emphasize the importance of capturing the interaction effect between ID and PD (Oh & Contractor, 2012; Sambharya, 1995). The regression results indicate that R^2 has improved significantly after adding the interaction effect. The PD positively moderates the relationship between ID and performance. We have found that this moderating effect is more intensive for firms with higher level of ID and this result is similar to the conclusions derived by Oh and Contractor (2013; 2012). They have shown that PD

positively moderates the relationship between ID and performance for firms with higher level of ID. According to Hitt *et al.* (1997), following unrelated PD provides managers with some experience and skills to manage the complexity which occurs by following ID. It is plausible that learning from PD assist firms use PD and ID to achieve economies of scale and scope at the level that is unavailable to the firms that have followed only PD or ID. Following ID provides firms with a global network that can assist product diversified firms exploit market imperfection and their bargaining power (Oh & Contractor, 2012). However, this finding is in contrast to the rationale by some studies (Geringer *et al.*, 2000; Tallman & Li, 1996) that following PD and ID together can decrease a firm's performance because of increasing coordination and governance costs.

7. Managerial Relevance

Firms allocate a large degree of their resources to follow diversification strategy and therefore the success or failure of the strategy has an effect on their performance. Based on the results of the study, managers need to look at product and international diversification as complementary strategies. Product diversification can reduce the negative effect of international diversification and can intensify the positive effect of that on firms' performance. Also, managers need to monitor the level of PD and ID and balance them to capture the highest level of performance in each stage of diversification. This task can be done through a small department which forecasts and monitors the results of firms' diversification strategy as well as comparing the company's position against the peers.

For instance table 6 shows the data on performance and level of PD and ID for three firms with 2-digit SIC code of 35 (Industrial and Commercial Machinery and Computer Equipment). For example, by using figures 5 to 8 managers of FMC Technologies Inc can compare their firm's performance to other firms in the industry as well as the frontier of diversification. The figures depict that ROA and ROS of Illinois Tool Works Inc are higher than the frontier but its sales growth and Tobin's Q (it is not shown in figure 8 as it is under the surface) are lower than the frontier. Figure 5 shows that FMC Technologies Inc has higher sales growth than Illinois Tool Works Inc which has lower level of PD and ID. Also, its sales growth is lower than JOY Global Inc which has higher level of ID but lower level of PD. Moreover, table 6 and figures 6 to 7 present that FMC Technologies Inc has lower ROS and ROA than JOY Global Inc and Illinois Tool Works Inc. However, its Tobin's Q (figure 8) is approximately double of two other firms. Therefore, although the accounting measures

of performance are lowest for FMC Technologies Inc, financial market is more optimistic about the future performance of the FMC Technologies Inc. So, managers of JOY Global Inc and Illinois Tool Works Inc may look at this result as an alert for reviewing their diversification strategies.

Table 6
Diversification and performance data for FMC Technologies Inc and its peers

Company Name	ID	PD	Sales Growth	ROA	ROS	Tobin's Q
JOY Global Inc	0.18	0.48	0.25	14.97	18.2	1.73
FMC Technologies Inc	0.49	0.7	0.22	10.41	8.7	3.1
Illinois Tool Works Inc	0.46	0.41	0.12	13.25	12.92	1.53

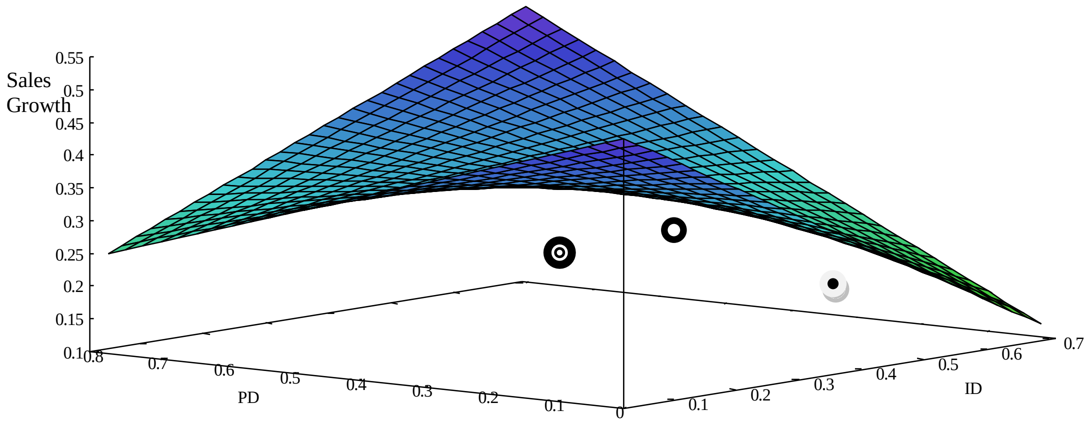

Figure 5
Comparison of FMC technologies Inc's sales growth to the peers'

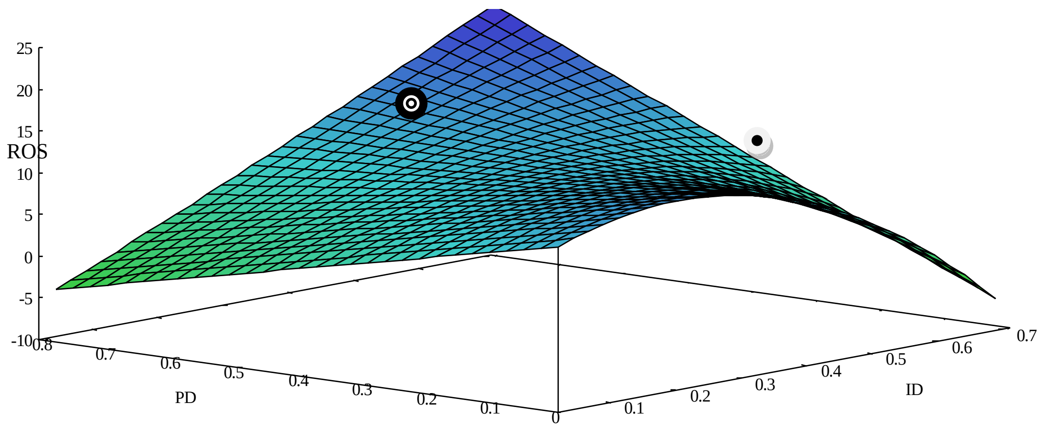

Figure 6
Comparison of FMC technologies Inc's ROS to the peers'

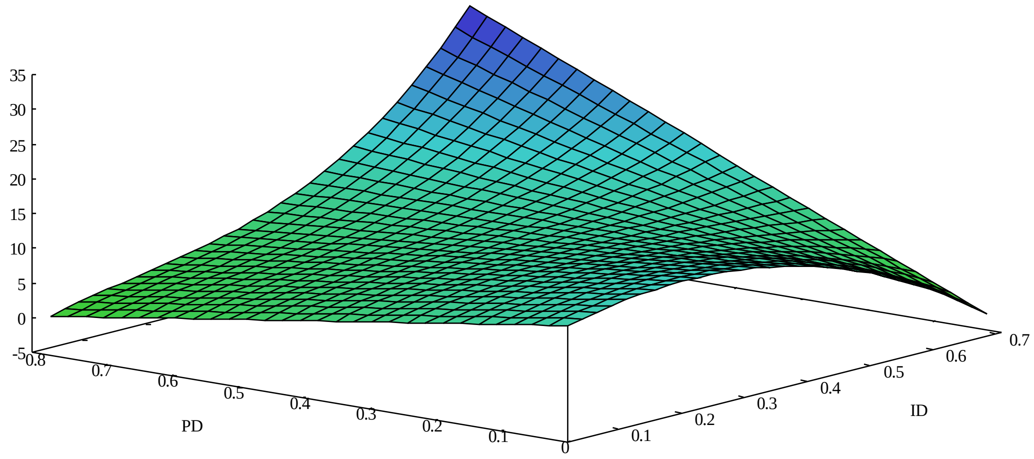

Figure 7
Comparison of FMC technologies Inc's ROA to the peers'

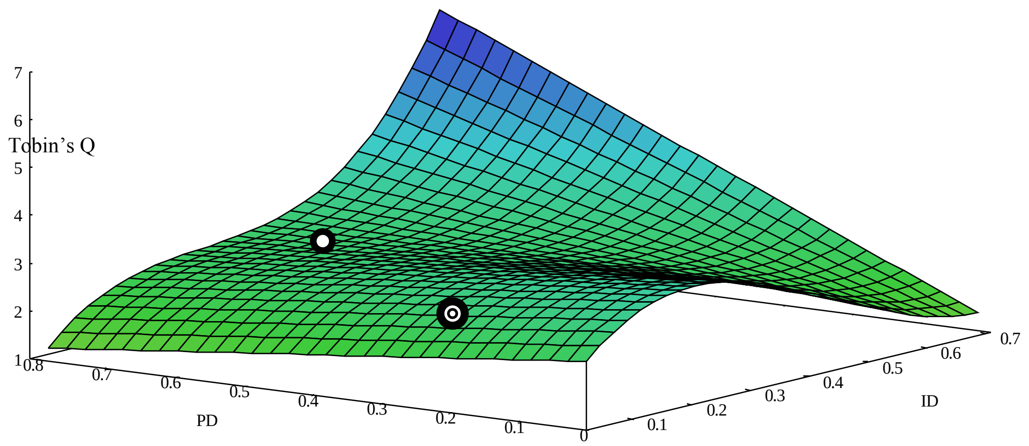

Figure 8
Comparison of FMC Technologies Inc's Tobin's Q to the peers'

8. CONCLUSION

In this study we have developed a new comprehensive measure of diversification and tested its predictive validity against Vachani's (1991) TGD by assessing the relationship between diversification and performance in U.S. largest manufacturing firms. The result shows that the new comprehensive measure of diversification has a higher predictive validity. The result reveals that product diversification does not have an effect on firms' performance and there is a sigmoid relationship between international diversification and Tobin's Q. Moreover, product diversification positively moderates the relationship between international diversification and performance.

Firms allocate a large degree of their resources to follow diversification strategy and therefore the success or failure of the strategy has an effect on their performance. Based on the results of the study, managers need to look at product and international diversifications as complementary strategies. Product diversification can reduce the negative effect of international diversification and can intensify its positive effect on firms' performance. The managers need to monitor the level of PD and ID and balance them to capture the highest level of performance at each stage of diversification. This task can be done through a small department that forecasts and monitors the results of firms' diversification strategy as well as comparing the company's position against the peers.

This study has some limitations. Firstly, as Bryce and Winters's (2009) inter-industry relatedness index is designed to capture the relatedness among manufacturing firms, the sample of the study was limited to the manufacturing firms. Secondly, due to the data availability for calculating CMD and TGD, the time period of the study was limited to one year.

9. REFERENCES

Acar W &Sankaran K. (1999) The myth of the unique decomposability: specializing the Herfindahl and entropy measures? *Strategic Management Journal* **20**(10): 969-975.

Aggarwal R, Berrill J, Hutson E, *et al.* (2011) What is a multinational corporation? Classifying the degree of firm-level multinationality. *International Business Review* **10**(5): 557–577.

Amit R &Livnat J. (1988) Diversification and the Risk-Return Trade-Off. *The Academy of Management Journal* **31**(1): 154-166.

Berger PG &Ofek E. (1995) Diversification's effect on firm value. *Journal of Financial Economics* **37**(1): 39-65.

Berry CH. (1971) Corporate Growth and Diversification. *Journal of Law and Economics* **14**(2): 371-383.

Bettis RA &Mahajan V. (1985) Risk/Return Performance of Diversified Firms. *Management Science* **31**(7): 785-799.

Bowen HP &Wiersema MF. (2005) Foreign-based competition and corporate diversification strategy. *Strategic Management Journal* **26**(12): 1153-1171.

Bryce D &Winter S. (2009) A General Interindustry Relatedness Index. *Management Science* **55**: 1570-1585.

Capar N &Kotabe M. (2003) The Relationship between International Diversification and Performance in Service Firms. *Journal of International Business Studies* **34**(4): 345-355.

Cardinal LB, Miller CC &Palich LE. (2011) Breaking the cycle of iteration: Forensic failures of international diversification and firm performance research. *Global Strategy Journal* **1**(1-2): 175-186.

Castañer X &Kavadis N. (2013) Does good governance prevent bad strategy? A study of corporate governance, financial diversification, and value creation by French corporations, 2000–2006. *Strategic Management Journal*: 863–876.

Caves RE, Porter ME &Spence AM. (1980) *Competition in the open economy: a model applied to Canada,* Cambridge: Harvard University Press.

Chang &Hong J. (2000) Economic performance of group-affiliated companies in Korea: Intragroup resource sharing and internal business transactions. *The Academy of Management Journal*: 429-448.

Chang &Wang C-F. (2007) The effect of product diversification strategies on the relationship between international diversification and firm performance. *Journal of World Business* **42**(1): 61-79.

Chatterjee S &Blocher JD. (1992) Measurement of Firm Diversification: Is It Robust? *The Academy of Management Journal* **35**(4): 874-888.

Chatterjee S &Hadi AS. (2006) *Regression Analysis by Example*: Wiley.

Christensen HK &Montgomery CA. (1981) Corporate economic performance: Diversification strategy versus market structure. *Strategic Management Journal* **2**(4): 327-343.

Çolak G. (2010) Diversification, Refocusing and Firm Value. *European Financial Management* **16**(3): 422-448.

Collis DJ &Montgomery CA. (2004) *Corporate strategy: a resource-based view,* New York: McGraw-Hill/Irwin.

Combs JG, Crook TR &Shook CL. (2005) The Dimensionality of Organizational Performance and its Implications for Strategic Management Research. In: Ketchen D & Bergh D (eds) *Research Methodology in Strategy and Management.* Emerald Group Publishing Limited, 259-286.

Contractor FJ. (2012) Why Do Multinational Firms Exist? A Theory Note About The Effect of Multinational Expansion on Performance and Recent Methodological Critiques. *Global Strategy Journal* **2**(4): 318-331.

Contractor FJ, Kundu SK &Hsu C-C. (2003) A Three-Stage Theory of International Expansion: The Link between Multinationality and Performance in the Service Sector. *Journal of International Business Studies* **34**(1): 5-18.

Denis DJ, Denis DK &Yost K. (2002) Global Diversification, Industrial Diversification, and Firm Value. *The Journal of Finance* **57**(5): 1951-1979.

Farjoun M. (1994) Beyond Industry Boundaries: Human Expertise, Diversification and Resource-Related Industry Groups. *Organization Science* **5**(2): 185-199.

Gedajlovic ER &Shapiro DM. (1998) Management and ownership effects: evidence from five countries. *Strategic Management Journal* **19**(6): 533-553.

Geringer M, J., Tallman S &Olsen DM. (2000) Product and international diversification among Japanese multinational firms. *Strategic Management Journal* **21**(1): 51-80.

Grant RM, Jammine AP &Thomas H. (1988) Diversity, Diversification, and Profitability among British Manufacturing Companies, 1972-84. *The Academy of Management Journal* **31**(4): 771-801.

Hall EH &St. John CH. (1994) A methodological note on diversity measurement. *Strategic Management Journal* **15**(2): 153-168.

Hennart J-F. (2007) The theoretical rationale for a multinationality-performance relationship. *Management International Review* **47**(3): 423-452.

Hennart J-F. (2011) A theoretical assessment of the empirical literature on the impact of multinationality on performance. *Global Strategy Journal* **1**(1-2): 135-151.

Hitt MA, Hoskisson RE &Ireland RD. (1994) A mid-range theory of the interactive effects of international and product diversification on innovation and performance. *Journal of Management* **20**(2): 297-326.

Hitt MA, Hoskisson RE &Kim H. (1997) International Diversification: Effects on Innovation and Firm Performance in Product-Diversified Firms. *The Academy of Management Journal* **40**(4): 767-798.

Hitt MA, Tihanyi L, Miller T, *et al.* (2006) International Diversification: Antecedents, Outcomes, and Moderators. *Journal of Management* **32**(6): 831-867.

Hoopes DG. (1999) Measuring Geographic Diversification and Product Diversification. *MIR: Management International Review* **39**(3): 277-292.

Johanson J &Vahlne J-E. (1977) The Internationalization Process of the Firm-A Model of Knowledge Development and Increasing Foreign Market Commitments. *Journal of International Business Studies* **8**(1): 23-32.

Kim WC. (1989) Developing a Global Diversification Measure. *Management Science* **35**(3): 376-383.

Kim WC, Hwang P &Burgers WP. (1989) Global diversification strategy and corporate profit performance. *Strategic Management Journal* **10**(1): 45-57.

Kim WC, Hwang P &Burgers WP. (1993) Multinationals' diversification and the risk-return trade-off. *Strategic Management Journal* **14**(4): 275-286.

Kim WC &Mauborgne R. (1988) Becoming an Effective Global Competitor. *Journal of Business Strategy* **9**(1): 33-37.

Kirca AH, Hult GTM, Deligonul S, *et al.* (2012) A Multilevel Examination of the Drivers of Firm Multinationality: A Meta-Analysis. *Journal of Management* **38**(2): 502-530.

Laeven L &Levine R. (2007) Is there a diversification discount in financial conglomerates? *Journal of Financial Economics* **85**(2): 331-367.

Li L. (2007) Multinationality and performance: A synthetic review and research agenda. *International Journal of Management Reviews* **9**(2): 117-139.

Li l &Qian G. (2005) Dimensions of International Diversification: Their Joint Effects on Firm Performance. *Journal of Global Marketing* **18**(3/4): 7-35.

Lien LB &Klein PG. (2009) Using Competition to Measure Relatedness. *Journal of Management* **35**(4): 1078-1107.

Markides CC &Williamson PJ. (1996) Corporate Diversification and Organizational Structure: A Resource-Based View. *The Academy of Management Journal* **39**(2): 340-367.

Montgomery CA. (1994) Corporate Diversification. *The Journal of Economic Perspectives* **8**(3): 163-178.

O'Brien RM. (2007) A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity* **41**(5): 673-690.

Oh CH &Contractor FJ. (2012) The role of territorial coverage and product diversification in the multinationality-performance relationship. *Global Strategy Journal* **2**(2): 122-136.

Oh CH &Contractor FJ. (2013) A Regional Perspective on Multinational Expansion Strategies: Reconsidering the Three-stage Paradigm. *British Journal of Management*: S42–S59.

Palich LE, Cardinal LB &Miller CC. (2000) Curvilinearity in the diversification-performance linkage: an examination of over three decades of research. *Strategic Management Journal* **21**(2): 155-174.

Pils F. (2009) *Diversification, Relatedness, and Performance*: Gabler.

Purkayastha S, Manolova TS &Edelman LF. (2012) Diversification and Performance in Developed and Emerging Market Contexts: A Review of the Literature*. *International Journal of Management Reviews* **14**(1): 18-38.

Qian G. (1997) Assessing Product-Market Diversification of U.S. Firms. *MIR: Management International Review* **37**(2): 127-149.

Qian G. (2002) Multinationality, product diversification, and profitability of emerging US small- and medium-sized enterprises. *Journal of Business Venturing* **17**(6): 611-633.

Rajan R, Servaes H &Zingales L. (2000) The Cost of Diversity: The Diversification Discount and Inefficient Investment. *The Journal of Finance* **55**(1): 35-80.

Ramanujam V &Varadarajan P. (1989) Research on corporate diversification: A synthesis. *Strategic Management Journal* **10**(6): 523-551.

Ramírez-Alesón M &Espitia-Escuer MA. (2001) The Effect of International Diversification Strategy on the Performance of Spanish - Based Firms During the Period 1991-1995. *Management International Review* **41**(3): 291-315.

Robins J &Wiersema MF. (1995) A resource-based approach to the multibusiness firm: Empirical analysis of portfolio interrelationships and corporate financial performance. *Strategic Management Journal* **16**(4): 277-299.

Robins J &Wiersema MF. (2003) The measurement of corporate portfolio strategy: analysis of the content validity of related diversification indexes. *Strategic Management Journal* **24**(1): 39-59.

Ruigrok W &Wagner H. (2003) Internationalization and performance: An organizational learning perspective. *Management International Review* **43**(1): 63-83.

Rumelt RP. (1974) *Strategy, Structure, and Economic Performance,* Cambridge,MA: Harvard University Press.

Sambharya RB. (1995) The Combined Effect of International Diversification and Product Diversification Strategies on the Performance of U.S.-Based Multinational Corporations. *MIR: Management International Review* **35**(3): 197-218.

Servaes H. (1996) The Value of Diversification During the Conglomerate Merger Wave. *The Journal of Finance* **51**(4): 1201-1225.

Silverman BS. (1999) Technological Resources and the Direction of Corporate Diversification: Toward an Integration of the Resource-Based View and Transaction Cost Economics. *Management Science* **45**(8): 1109-1124.

St. John CH &Harrison JS. (1999) Manufacturing-based relatedness, synergy, and coordination. *Strategic Management Journal* **20**(2): 129-145.

Stowe JD &Xing X. (2006) Can growth opportunities explain the diversification discount? *Journal of Corporate Finance* **12**(4): 783-796.

Sullivan D. (1994a) Measuring the Degree of Internationalization of a Firm. *Journal of International Business Studies* **25**(2): 325-342.

Sullivan D. (1994b) The "Threshold of Internationalization:" Replication, Extension, and Reinterpretation. *MIR: Management International Review* **34**(2): 165-186.

Sullivan D. (1996) Measuring the Degree of Internationalization of a Firm: A Reply. *Journal of International Business Studies* **27**(1): 179-192.

Tallman S &Li J. (1996) Effects of International Diversity and Product Diversity on the Performance of Multinational Firms. *The Academy of Management Journal* **39**(1): 179-196.

Tanriverdi H &Venkatraman N. (2005) Knowledge relatedness and the performance of multibusiness firms. *Strategic Management Journal* **26**(2): 97-119.

Teece DJ, Rumelt RP, Dosi G, *et al.* (1994) Understanding corporate coherence: Theory and evidence. *Journal of Economic Behavior and Organization* **23**(1): 1-30.

Tennent J. (2008) *Guide to Financial Management*: John Wiley & Sons.

Thomas DE &Eden L. (2004) What is the Shape of the Multinationality-Performance Relationship? *Multinational Business Review* **12**(1): 89-110.

Ulbricht N &Weiner C. (2005) Worldscope meets Compustat: A Comparison of Financial Databases *SFB 649 Discussion Paper*, 064.

UNCTAD. (2010) *World investment report 2010: investing in a low-carbon economy*: United Nations Environment Programme.

Vachani S. (1991) Distinguishing between Related and Unrelated International Geographic Diversification: A Comprehensive Measure of Global Diversification. *Journal of International Business Studies* **22**(2): 307-322.

Vachani S. (1999) Global diversification's effect on multinational subsidiaries' autonomy. *International Business Review* **8**(5-6): 535-560.

Varadarajan PR &Ramanujam V. (1987) Diversification and Performance: A Reexamination Using a New Two-Dimensional Conceptualization of Diversity in Firms. *The Academy of Management Journal* **30**(2): 380-393.

Verbeke A &Brugman P. (2009) Triple-testing the quality of multinationality-performance research: An internalization theory perspective. *International Business Review* **18**(3): 265-275.

Vicic S. (2007) Researching Corporate Relationships. *The Colorado Lawer* **36**(1): 103-106.

Wan WP. (2005) Country Resource Environments, Firm Capabilities, and Corporate Diversification Strategies. *Journal of Management Studies* **42**(1): 161-182.

Wan WP, Hoskisson RE, Short JC, *et al.* (2011) Resource-Based Theory and Corporate Diversification: Accomplishments and Opportunities. *Journal of Management* **37**(5): 1335-1368.

Wiersema MF &Bowen HP. (2011) The relationship between international diversification and firm performance: Why it remains a puzzle. *Global Strategy Journal* **1**(1-2): 152-170.

Wolf BM. (1977) Industrial Diversification and Internationalization: Some Empirical Evidence. *The Journal of Industrial Economics* **26**(2): 177-191.

Zahra SA, Ireland RD &Hitt MA. (2000) International Expansion by New Venture Firms: International Diversity, Mode of Market Entry, Technological Learning, and Performance. *The Academy of Management Journal* **43**(5): 925-950.

Zimmerman A. (2013) *Company Information. Zimmerman's Research Guide, An Online Encyclopedia for Legal Researchers*. Available at: https://law.lexisnexis.com/infopro/zimmermans/disp.aspx?z=1313.